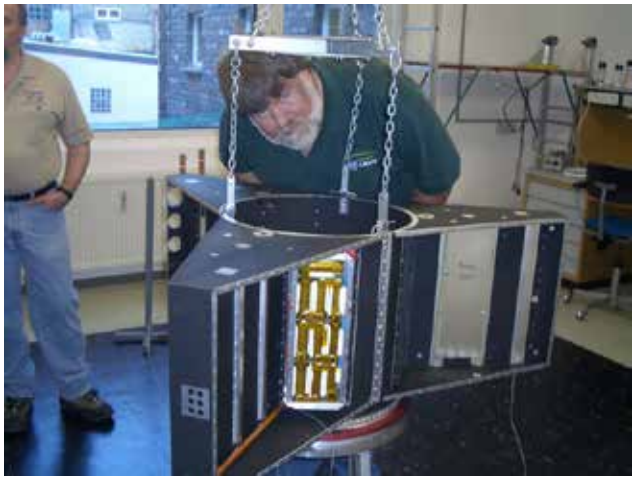
The AMSAT® Journal

Volume 38, Number 4 July/August 2015

in this issue ....



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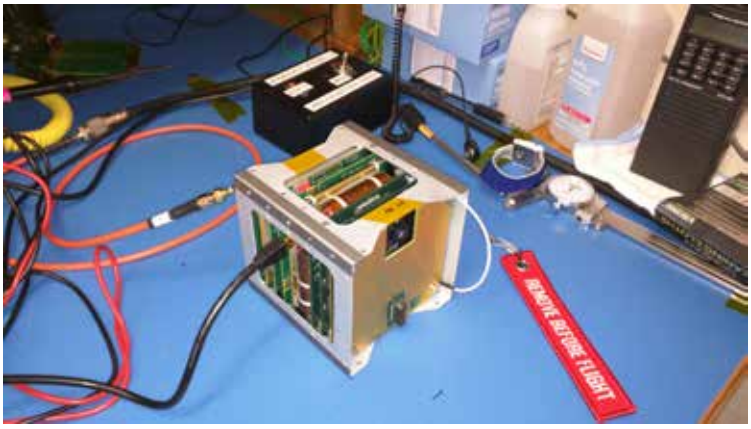


Fox-1C Engineering Model Development and Test

Periodicals
POSTAGE PAID
At Kensington, MD
and at additional
mailing offices

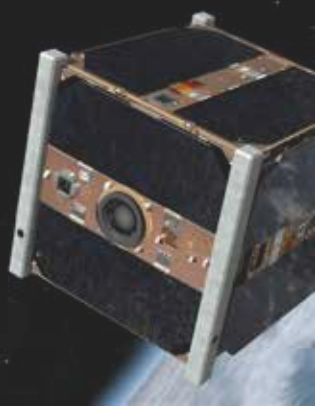
AMSAT-NA
10605 Concord St., Suite 304
Kensington, MD 20895-2526

Commit to the Future of AMSAT

- **AMSAT has committed to launching Fox-1C in 3Q 2015.**
- **We teamed with SpaceFlight, Inc. for integration and launch utilizing SpaceFlight's SHERPA System to sun-synchronous orbit in third quarter of 2015 and we have already paid the launch fee.**
- **AMSAT must now raise the funds to recover those funds to re-establish our reserves.**
- **Along with serving as a "rainy day fund", these reserves provide the "seed money" for future satellite projects.**
- **It takes real dollars to develop real satellites.**
- **As a result, AMSAT has initiated a $125,000.00 campaign to raise the capital needed to provide the resources to maintain our ability to initiate future projects.**

Please consider these donation options

- **Donate to the AMSAT President's Club**
- **Cash gifts with your credit card, PayPal, or check**
- **Gift of life insurance by naming AMSAT as a beneficiary**
- **Gift of stocks or other securities**
- **Bequest to AMSAT in your will or trust**
- **AMSAT is a 501(C)(3) non-profit organization**
- **Call the AMSAT-NA office at 301-822-4376 for questions on any or all of these ways to keep Amateur Radio in space.**



Support AMSAT-NA http://www.amsat.org

AMSAT Announcements

AMSAT 2015 Symposium Call for Papers

This is the call for papers for the 2015 AMSAT-NA Annual Meeting and Space Symposium to be held on the weekend of October 16-18, 2015. Proposals for papers, symposium and poster presentations are invited on any topic of interest to the amateur satellite community. We request a tentative title of your paper or presentation as soon as possible. The final copy must be submitted by September 15 for inclusion in the printed proceedings.

Abstracts and papers should be sent to Dan Schultz at n8fgv at amsat.org

The 2015 AMSAT Space Symposium and Annual Meeting will be held October 16, 17, 18, 2015 at the Crowne Plaza Hotel, 33 East 5th Street, in Downtown, Dayton, Ohio.

Amateur Radio Roundtable Webcast Featured AMSAT

On July 14 Drew Glasbrenner, KO4MA, AMSAT Vice President of Operations, and Jerry Buxton, N0JY, AMSAT Vice President Engineering were the featured guests on Amateur Radio Roundtable, a live weekly webcast hosted by Ted Randall, WB8PUM, and Tom Medlin, W5KUB.

Drew and Jerry talked about Fox-1A and Fox-1C getting ready to launch. AMSAT's history and some future plans were discussed. This episode of Amateur Radio Roundtable was archived and can be viewed on YouTube at this link:

http://tinyurl.com/W5KUB-AMSAT

AMSAT's Mission

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

AMSAT's Vision

Our Vision is to deploy satellite systems with the goal of providing wide-area and continuous coverage. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.

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The AMSAT Journal staff is always interested in article submissions. Whenever possible, submissions should be sent via e-mail to journal@amsat.org using plain text or word processor files; photos or figures in TIF, GIF or JPEG formats. Kindly do not embed graphics or photos in your manuscript - we prefer receiving those as separate files. AMSAT-NA reserves the right to select material for *The AMSAT Journal* based on suitability of content and space considerations. The editors of this publication are volunteers giving freely of their talents, time and efforts to produce *The AMSAT Journal*.

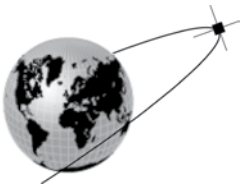
We're in the "dog days of summer" with lots of summer heat and people trying to stay cool as summer vacations are taken. That said, AMSAT right now has much on its plate that is keeping our leadership and engineering teams quite busy.

Phase 3-E

AMSAT-DL and AMSAT-NA have announced that an agreement has been reached where AMSAT-DL would allow the Phase 3-E space frame to be shipped to Virginia Tech in the event that there is an opportunity to place the satellite into a High Earth Orbit. The Special ANS Bulletin announcing this news was released on Saturday, July 25, following the joint announcement that was made at the AMSAT-UK Colloquium by AMSAT-DL President Peter Guelzow, DB2OS, and AMSAT-NA VP-Operations Drew Glasbrenner, KO4MA, as well as a presentation made by Bob McGwier, N4HY, at the Central States VHF Society Conference in Denver, CO the same day. Bob is Director of Research at Virginia Tech's Hume Center for National Security and Technology. The content of the Special ANS Bulletin is included in this issue (page 5).

The Phase 3-E space frame has been in storage for a number of years in Germany. The satellite project was impacted by the withdrawal of US amateur volunteer involvement in 2006 due to ITAR and the inability to find an affordable launch. AMSAT-DL attempts to gain German Government support were also unsuccessful, resulting in little prospect for P3-E being completed and flown as intended.

Bob, N4HY, and the Virginia Tech Hume Center team are leading an effort to utilize the P3-E space frame for open source experiments of interest to the US Government in exchange for using the spacecraft for both scientific payloads and as an amateur radio satellite. Under the proposal, the US Government would underwrite the cost of development at VT as well as provide an appropriate launch. This approach eliminates the need for a propulsion system, removing a significant technical risk as well as opening up the satellite to handle more payload. Virginia Tech's Hume Center would be responsible for managing the project under US Government contract, handling both the experiments and amateur radio integration. AMSAT-NA would be responsible for securing IARU frequency coordination, gain FCC Satellite Licensing, and be responsible for controlling the spacecraft once in orbit under FCC authorization as a satellite operating in the Amateur Satellite Service.



While the US Government has expressed interest in the proposal, we will not know until later this year (or later) whether funds can be budgeted by the US Government to have Virginia Tech perform this work and to provide a launch as a secondary payload. Members of AMSAT-DL heard a presentation by Bob, N4HY at their Annual Meeting on July 4th describing the proposal and voted to offer the space frame in the event it would indeed be flown. Given the need of AMSAT-DL to notify their membership of the vote that was taken at their Annual Meeting, AMSAT-DL and AMSAT-NA have made public this potential opportunity. We're keeping our fingers crossed that VT's offering to the US Government to fly a low cost mission using an existing amateur satellite space frame will materialize given the significant scientific benefit.

Geosynchronous Orbit Opportunity

By now you've received from AMSAT a letter from the Board of Directors (BoD) outlining the status of several projects, including the GSO Opportunity that was announced in April. This project has the goal of integrating an amateur payload into an existing satellite that will be placed in Geosynchronous Orbit over the Western Hemisphere serving all of the Region Two countries, recognizing that the primary satellite payload will determine the location of the satellite. Additional details about the proposed payload can be found in the "Apogee View" column of the May/June 2015 issue of the *AMSAT Journal*.

A key component is the need to perform a "Payload Analysis" that will determine the feasibility of integrating an amateur payload into an existing satellite currently under construction by Millennium Space Systems (MSS) for the US Air Force Wide Field of View (WFOV) program. We announced at Dayton that the estimated cost of the Payload Analysis is $100,000.00. To date, we've collected about $75,000.00 in donations that are being applied to cover the cost of the Payload Analysis. As the BoD letter notes, we must raise the balance in order to cover this expense.

AMSAT and Virginia Tech (VT) are working together to put together a package for

continued on page 4 ...

Apogee View - continued from page 3 ...

submission to MSS so that they can evaluate the feasibility of the integration and assess potential risks of adding this payload to the existing spacecraft. The focus right now is to meet MSS's technical requirements for submission, including Statement of Work, Payload Description, and Concept of Operations. VT's Project Manager Sonya Rowe, KK4NLO, is working with AMSAT VP-Engineering Jerry Buxton, N0JY, on preparing these documents. Clearly, the work to be done by MSS is also dependent upon paying for the cost of the Analysis, which is why we're asking for donations to defray the cost of the Analysis.

The US Air Force is well aware of the potential benefits of placing an amateur payload into GSO, particularly with regard to emergency communications. That said, the results of the Payload Analysis will influence their decision to allow this payload to fly on their spacecraft. There may also be other terms and conditions that the USAF may place on this project that will determine the overall feasibility from a VT and AMSAT perspective as well. While we're all excited about the potential value of this this proposal to amateur radio, we recognize that no decision has been made yet to allow the placement of an amateur payload on a USAF spacecraft. Stay tuned…

Fox Class Satellites

The anticipated launch of Fox-1A is quickly approaching! We're awaiting confirmation of the projected launch date, but we currently expect a "Late September" time frame. Needless-to-say, our volunteers that built this satellite will soon see the fruits of their efforts be flown into space, providing a variety of services to the amateur radio community while providing support for the scientific payloads on board. The launch represents a culmination of six years of effort to place a new FM-capable satellite in service.

Meanwhile, work continues on Fox-1C in preparation for launch. As I previously noted in my earlier "Apogee View", AMSAT does not know what impact there might be on the launch schedule given the Falcon-9 failure that took place on June 28, 2015. SpaceX announced on July 20 a preliminary cause that resulted in an overpressure event in the upper stage liquid oxygen tank approximately 139 seconds into the flight (a flawed strut inside the second stage).

Consequently, while the "official" launch timeframe is still by "the end of the year", it would probably be prudent to presume that there is some likelihood that the launch may fall back into 2016. We don't anticipate an update from Spaceflight, Inc. on the launch status until after SpaceX determines the impact on scheduling resulting from making any needed changes on their Falcon 9 launch vehicles before being used for subsequent flights.

We continue to seek support to pay for the Fox-1C launch. The BoD Letter to the membership that was enclosed with the BoD ballot notes the need for donations to cover the launch. Please help AMSAT to cover this launch cost. We look forward to having two Fox Class satellites in orbit in the near future, significantly enhancing "keeping amateur radio in space."

There is also RadFxSat/Fox-1B which was accepted into the ELaNa (Educational Launch of Nanosat) program in February 2012. Vanderbilt University's Institute of Space and Defense Electronics (ISDE) is providing the scientific payloads for this satellite and they were the ones that submitted the ELaNa application. AMSAT is responsible for development of the space frame and the supporting electronics, including the amateur radio transmitter and receiver. Work continues on securing a launch. We're reasonably optimistic that we may know in the near future whether a potential opportunity will indeed materialize for launch to an acceptable orbit.

Honoring Cliff Buttschardt, K7RR

Long time Project OSCAR and AMSAT member Cliff Buttschardt, K7RR, passed away on July 30, 2006 at age 75. Project OSCAR awarded Cliff their Lifetime Achievement Award (their highest honor) to him just days before his passing for his contributions to amateur radio.

Cliff served as an advisor/mentor to students building cubesats at Cal Poly. An active CW operator, Cliff participated in the SKN ("Straight Key Night") on the OSCAR satellites and was a perennial "Best Fist" winner. The OSCAR SKN that took place on January 1, 2007 was dedicated to the memory of Cliff. Cliff also served as an Area Coordinator as part of the AMSAT Field Operations Team.

Cliff's wife, Mable Vierthaler passed away in 2013. Both AMSAT and ARRL were notified that they were designated as beneficiaries of the Trust that they had established. Both organizations received similar amounts from the Trust, with AMSAT receiving the initial distribution in mid-July. The initial distribution to AMSAT was around $270,000.00.

AMSAT was not aware of Cliff and Mable's bequest until the attorney handling the Trust distribution earlier this year notified us, but the actual amount was not disclosed until AMSAT received the funds.

Given the significant gift that Cliff and Mable have bestowed on AMSAT, The AMSAT Board of Directors has been discussing various ways that we might recognize their generosity. Given Cliff's interest in cubesats, the consensus of the Board is to change the designation of Fox-1C ("Charlie") to "Fox-1C ("Cliff") and to have the voice identification of the satellite utilize the new designation.

Consequently, AMSAT VP-Engineering Jerry Buxton, N0JY, reached out to Veronica Monteiro, the "voice" of Fox-1A and daughter of former AMSAT VP-Engineering Tony Monteiro, AA2TX (SK) to record a voice identification announcement for the satellite. Veronica subsequently provided the recording to Jerry, "Hi. This is amateur radio satellite Fox-1 Cliff".

When Fox-1 Cliff is placed in orbit, it will be a fitting recognition of an avid AMSAT member and generous husband and wife team who took steps to help provide the resources to keep AMSAT moving forward. AMSAT is humbled by Cliff and Mable's generosity. Given our financial situation, this donation certainly helps to provide a stronger footing for AMSAT.

Please realize that our long-term viability is dependent upon having resources needed to maintain the organization as well help with our projects. One key difference between ARRL and AMSAT is that they have a financial base that allows them to place Cliff and Mabel's gift into an "endowment fund", using the interest/dividends generated from the Endowment Fund to provide the funds for various goals/projects without touching the gift itself. AMSAT doesn't have that luxury. We use our "reserves" to cover immediate needs and hope that we can "pay back" the reserves in the future. We did that with the Fox-1C launch contract; we paid it when we had to but hadn't yet done a funding campaign. We're now doing that campaign in the expectation we can replenish that reserve, which gives us the ability to use funds when we need to in the future. If we don't raise these funds, it impacts our ability to cover future projects.

Given our finances, we must continue to encourage donations from the AMSAT membership and others for our satellite projects in order to maintain AMSAT's long-term viability. Please don't make the assumption, "Cliff donated, so I don't have to." AMSAT's future is dependent upon raising the funds necessary to pay for project development and launches, and we have already committed to a launch for Fox-1Cliff ($125,000.00) and the GSO Opportunity ($100,000.00) that we must cover through donations. Every dollar donated helps AMSAT to fulfill its mission as a scientific and education organization and keeping amateur radio in space.

This bequest also reminds us that as each one of us considers estate planning, there is the opportunity to provide support to help keep amateur radio's future in space following our passing. My wife (Kathy, WD4ASX) and I have taken such steps, and as AMSAT is a scientific and education organization, I hope that you will designate AMSAT in your estate plans as well.

33rd AMSAT Space Symposium

The BoD Ballot envelope also contained a flyer for the upcoming AMSAT Space Symposium and Annual Meeting in Dayton, OH. This is a great opportunity for you to attend a conference where AMSAT's Engineering Team will provide updates on the variety of projects currently underway, meet with the AMSAT Leadership Team, and have an opportunity to enjoy what Dayton has to offer, including the National Museum of the US Air Force.

The AMSAT Store has been updated to accept your Symposium Registration and associated activities. Hotel reservations must be made with the Crowne Plaza-Dayton by calling the hotel's reservation service directly. The best number to call is 800-689-5586, which goes to an offsite reservation service that handles the Crowne Plaza- Dayton reservations. The "Group Code" is "**RAD**" but if you mention "AMSAT", that should also work. Note that this phone number and the Group Code are different than what is on the flyer.

Additional details may be found on the Symposium flyer.

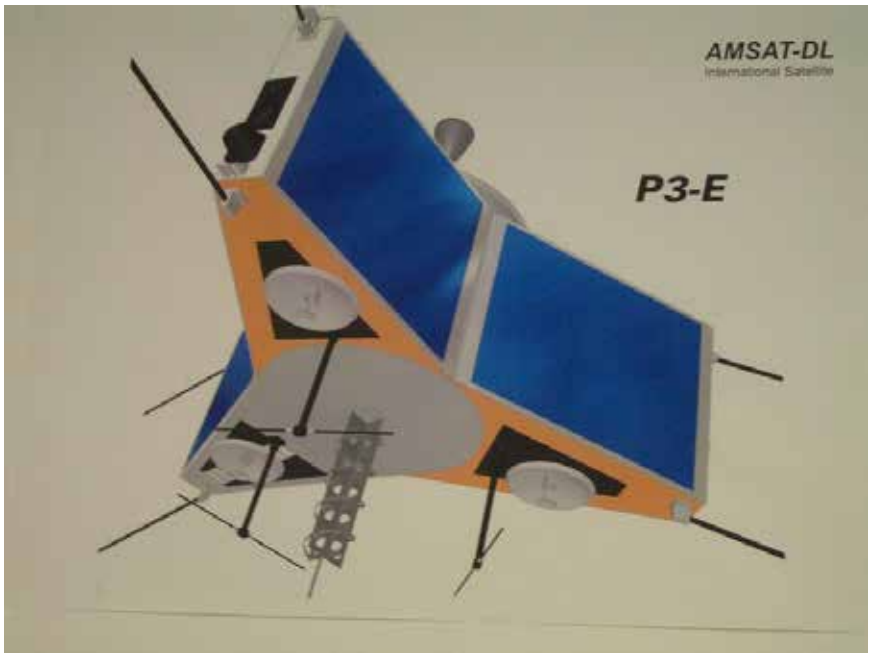
See ya at Dayton in October!

AMSAT-NA, AMSAT-DL, and Virginia Tech Announce Potential Phase-3E Opportunity

Virginia Tech has approached the US government to fly the Phase 3-E space frame into High Earth Orbit (HEO) in order to support scientific payloads as well as serve as an amateur radio satellite. During the AMSAT-DL Annual Meeting on July 4, 2015, the membership approved the concept, agreeing to allow the Phase 3-E space frame that is currently stored in Germany to be shipped to Virginia Tech in the USA. There it will undergo further construction, testing and preparation for eventual launch to HEO should the US government formally agree to fund such a mission.

Should the project move forward, AMSAT-NA will apply for frequency coordination from the IARU Satellite Advisor and satellite licensing from the FCC as the satellite's initial operator.

Stay tuned to the *AMSAT-DL Journal*, the *AMSAT-NA Journal*, and the AMSAT-NA News Service for further developments and details as they become known.



AMSAT-DL depiction of the Phase 3-Express (P3E) satellite in 2005-2006. Changes in the antenna configuration are planned in 2015. The rocket motor and propellant tank will not be needed on the proposed launch opportunity.

The P3E spaceframe will have room for scientific and amateur radio payload. Bdale Garbee, KB0G, is shown with the spaceframe at AMSAT-DL in 2005.

AMSAT 2015 Field Day Results

Bruce Paige, KK5DO
kk5do@amsat.org

Oh was it close this year! Yes, who could have predicted the outcome of this year's Field Day? Six points separated first and second place. We had a bunch of home operators chime in this year.

The number of satellites used this year dropped from 12 last year to 9. I count the satellites based on their modes as you can make contacts using both modes. SO-50 has one FM transponder and I count that as one satellite whereas AO-07 has two modes, SSB and CW and gets counted as 2 satellites.

There were no ISS voice contacts this year; only digital contacts and three groups chose to use it. NO-84 was only used to make one contact and SO-50, one of the hardest satellites to use on Field Day, carried 12 contacts.

The number of participating AMSAT Field Day stations has remained pretty constant over the years as evidenced by the table below. QSO count has dropped down to almost the mean of 318.2 QSOs over 11 years.

First place this year goes to Cedar Valley Amateur Radio Club, W0GQ, with 86 points. Second place goes to Southwest LA Amateur Repeater Club, W5BII, with 80 points who last year was tied for last place. Third place did not participate last year but has in previous years, the Huntsville Amateur Radio Club, K4BFT, with 50 points.

Last year's first and second place holders did not submit entries this year. The third place, Houston QRP Club, W5MSQ, dropped from 3rd place to 4th place with a respectable score of 36 using low power.

There were many stations operating from home with both emergency power and commercial power. They were, by call area: Clayton, W5PFG; George, WA5KBH; Frank, K6FW; Paul, N8HM; and Patrick, WD9EWK. Paul, N8HM, took the winning spot for home station on emergency power with 20 points. Last year was Paul's first year participating in AMSAT Field Day.

Table 1: 2015 AMSAT Field Day Results
(In case of a tie the callsigns are listed alphabetically)

	Call	Class	QSOs
1	W0GQ	19A	86
2	W5BII	2A	80
3	K4BFT	4A	50
4	W5MSQ	4A	36
5	W6YX	5F	29
6	N8HM	1B	20
7	K6FW	1D	15
8	K4LRG	4A	12
9	NI6BB	2E	11
10	W6PA	2A	9
11	W5PFG	1D	8
12	VE3SAR	3A	6
13	WA5KBH	1D	6
14	N4EH	6A	4
15	WD9EWK	1B	4
16	W4CVY	4A	3
17	VE3JW	2A	2
18	W0WTN	7A	2
19	K1EME	2A	1
20	K6QM	10A	1
21	WA7LAW	4A	1

The 9 satellites that we had in use this year were:

- SO-50 (FM),
- AO-7 (SSB and CW),
- AO-73 (SSB and CW),
- FO-29 (SSB and CW),
- NO-84 (Digital), and
- ISS (Digital).

W5BII was the only station reporting a contact on NO-84 and W5BII, W6YX, and WD9EWK were the only ones that used the ISS. The majority of contacts (175) were on FO-29 SSB. The, next most-used satellite was AO-73 SSB with 55 contacts followed by AO-7 SSB with 39 contacts.

Fifteen year old Nicholas, KE8AKW, sent in Photo 1 of him operating the WH8N station right before their satellite contact on the last pass of AO-73 for Field Day. Photo 2 shows Tom, WB2LRH, as the manual rotor for the Hospital Disaster Support Communications System, W6PA, station. In Photo 3, you can see members of South Jersey Radio Association, K2AA, which is the oldest continuously meeting radio club in North America where they made their one contact for the ARRL bonus.
The Lambton County Radio Club in Ontario,

Table 2: Comparison of AMSAT Field Day Results by Year

	2008	2009	2010	2011	2012	2013	2014	2015
Satellites	8	12	12	9	9	7	12	9
QSOs	220	328	387	335	263	443	305	316
Stations	17	20	18	14	19	23	21	21
Points	270	486	505	455	329	613	357	386

VE3SAR, has a nice station, shown in Photo 4, with their operator Art, VE3GNF, in Photo 5. The radio in Photo 6 of the Battleship Iowa Amateur Radio Association, NI6BB, looks like it was getting water cooled by mother nature and Photo 7 shows their satellite antennas. Photo 8 shows the NI6BB satellite station.

Patrick, WD9EWK, is always trying something and for Field Day, he broke out his equipment for some fun. Photo 9 shows his gear, a TH-D72A and ID-51A handheld with an Elk log periodic. He reported no ontact on the first ISS pass but did on the second two, logging only one of them per the rules.

Tim, N8DEU, said the Huntsville Amateur Radio Club, K4BFT, station was able to allow visitors to hear the SSB/CW satellites using a 4 channel headphone amplifier for the first time. He said it was a big hit for them this year. It was also the first year they worked AO-73. At the Lake Area Radio Klub, W0WTN, station, Kevin, KB0LCR, was their operator and Joe, KK0SD, assisted for their satellite contacts.

If you are wondering where Hector, CO6CBF/W5CBF, was for Field Day, he was at the Southwest LA Amateur Repeater Club, W5BII, station (our second place winner). George, WA5KBH, said that Hector took the lead and operated all the satellites he could for the club. And here they are in Photo 10.

The Snohomish County Hams Club, WA7LAW, had a nice spot for Field Day as shown in Photo 11, with Ed, WA7ETH, at the controls. Photo 12 shows the mobile station for Lake Monroe Amateur Radio Society, N4EH, is in. The Ottawa Valley Mobile Radio Club, VE3JW, shows off their station in Photo 13 with Maurice-Andre, VE3VIG, at the mic. Finally Photo 14 is from the Houston QRP Club, W5MSQ, with their station and Andy, W5ACM, in Photo 15. One of the visitors to their site is shown in Photo 16 wondering what is going on.

I had a lot of fun writing this year's story. Next year, as I have said many, many years before, I hope that we have even more participants in the AMSAT Field Day. Hopefully, Murphy will not visit your Field Day site. But if he does, be prepared.

More photos next pages...

Photo 1: Nicholas, KE8AKW

Photo 2: W6PA with Tom, WB2LRH as the manual antenna rotor

Photo 3: K2AA, South Jersey Radio Association

Photo 4: Lambton County Radio Club in Ontario, VE3SAR

Photo 5: Art, VE3GNF operating at VE3SAR

Table 3: Breakdown of Contacts Per Satellite

SO-50 Phone	AO-7 Phone	FO-29 Phone	AO-73 Phone	NO-84 Digital	AO-7 CW	FO-29 CW	AO-73 CW	ISS APRS
12	39	175	55	1	1	4	7	3

Photo 6: NI6BB satellite station aboard the Battleship Iowa

Photo 7: NI6BB satellite antennas installed aboard the Battleship Iowa

Photo 8: NI6BB satellite station

Photo 9: WD9EWK portable satellite gear ready for action

Photo 10: (L-R) Hector, CO6CBF/W5CBF and George, WA5KBH

Photo 11: The Snohomish County Hams Club, WA7LAW, had a nice spot for Field Day with Ed, WA7ETH at the controls

Photo 12: The mobile station for Lake Monroe Amateur Radio Society, N4EH

Photo 13: The Ottawa Valley Mobile Radio Club, VE3JW, shows off their station with Maurice-Andre, VE3VIG, at the mike

Photo 14: Houston QRP Club, W5MSQ

Photo 15: Andy, W5ACM operating at W5MSQ

Field Day comments from the peanut gallery ...

Paul, N8HM - Weather was awful, so I was just operating from the grounds of my apartment building here in DC. I managed 20 QSOs with 5 watts, which wasn't easy with how overloaded the transponders were with strong signals. Maybe next year I'll help out a local club on the sats.

John, KG4AKV - As for satellites, it was a bust. For the 7 PM Eastern SO-50 pass, 70 degrees here in North Carolina, I found a good spot in the field and found markers for the AOS, max elevation and LOS. Then a major storm front came through which wiped out all possibility of making any contacts.

Wyatt, AC0RA - Had a decent time here in Iowa operating as W0GQ. Missed out on several AO-73 passes Sunday due to weather and the failure of 2 generators at the same time. Station used here was IC-9100 with 7 elements on 2 m horizontal and two 8 foot 435 yagis with switch for vertical and horizontal all mounted on a G-5500 at about 24 ft. For 10 m downlink on AO-7 I used a moxon at 40 ft. Personal best for me on AMSAT Field Day so was pretty pleased and had a good time.

Alan, WA4SCA - FO-29 sounded like 20 meters, with many excellent signals. A few stations, such as K4BFT, were grinding out the contacts like a machine!

Rich, W4BUE - K4AMG was GOTA station for W4CAR. The Leas operated both FO-29 and HF. The kids made another 5 contacts on FO-29 later. They did an equally well job on HF. N2COP ARRL Vice Director Roanoke Division dropped by and took pictures with the kids next to our SATCOM antennas.

Bill, W1PA - I ran the satellite station for W1BIM (6A central MA). Nothing fancy -- FT-847, tripod mounted arrow, no computer (full manual). Started raining around 7 PM, turned to horizontal rain by 11 PM, and then at 3 AM the wind gusts toppled multiple station tents. Horizontal rain, and 30 mph gusts the rest of Sunday morning -- a real Nor'easter.

David, KY7DR- I ran W4CVY for our club's Field Day effort from west/central Georgia. This year I finally got circ-polarized crossed Yagis for 2 m and 70 cm (M2 LEO pack purchased through the AMSAT store), got fully automatic tracking working. Made 3 contacts total, all SSB on FO-29. SO-50 was just chaos.

Bill, KG5FQX - I made my first via-satellite contact attempt on two afternoon SO-50 Saturday passes (operating as KK5W for Field Day). I suppose Field Day is probably the worst time to try for a first contact. I couldn't bust the pile up with my little HT, but I can't wait to try again (and again, and again)!

Patrick, WD9EWK - I had originally planned to do Field Day from the mountains near Flagstaff, in northern Arizona. Unfortunately, work got in the way of those plans, when a phone system upgrade was scheduled for Field Day weekend. After the phone system work was moved to this weekend, I had hoped to try working a pass or two early on Saturday afternoon, before going into the office. Instead, I brought some gear to the office on Saturday, and was able to work some passes from balconies at my office. That was fun!

Photo 16: The neighbors wondered what was going on over at the W5MSQ Field Day site with the lights on at all hours, pointing silver antlers at the sky, and all kind of beeps and bloops

George Carr, WA5KBH
Hector Martinez CO6CBF/W5CBF

(left) We managed to collect and clean up a 10-element 2 m yagi and an 18-element 70 cm yagi for our antenna farm. We scrounged up an old and, I might add, well-used but working Yaesu 5400 az/el rotor and control box. (The gears of the az rotor did creak a bit loudly!) This set-up we mounted on the trailer hitch of my Toyota Highlander. However, the best plans "of mice and men" on the drawing board are often not in compliance with reality. The rotor support was a bit short. The antennas would have collided with the vehicle on certain higher passes. While we were able to transport the antenna arrays safely to and from the Field Day site (thanks to a rear escort car), we ended up ...

... mounting the rotor support and antenna array on a ground mount. Here (left to right), KG5GGL, W5CBF, KI5EE (hidden in front of W5CBF, Joan (XYL of WA5KBH) aligning array with her arms outstretched) and KG5TED, seated resting, braved the 90+ degree heat and 90+ percent humidity to set up the Hamsat array in time for the first passes. Hector ...

W5CBF/CO6CBF, was the main satellite operator at the Southwest Louisiana Amateur Repeater Club (W5BII) Field Day camp. We operated as 2A LA running emergency power. Shown are (L-R) George Carr, WA5KBH, and Hector Martinez, W5CBF/CO6CBF.

When it worked out that Hector would be visiting my Lake Charles, LA, QTH in late June, I immediately asked him if he would like to participate in Field Day with our local club, The Southwest Louisiana Repeater Club. Without hesitation, Hector replied, "Yes, this would be my first Field Day in the United States."

As I discussed my prior year's experiences using an Arrow, Yaesu FT-847 and Icom IC-706MKII, he stopped me dead in my tracks. And in his best Cuban-American accent and with a competitive spirit in his voice, added, "No, no, if we are going to do Field Day, we are going to do it right ... and we will try to win!"

The gear used was a FUNCube Dongle Pro plus running in HDSDR as receiver and the ICOM IC-706MKGII as transmitter. For digital modes on the ISS and NO-84, we used the Signalink USB interface, the UZ7HO's Sound Modem, MixW and UISS software. Everything was controlled by SATPC32.

We did not have good horizons in the park. We were in a hole with a very thick forest all the way around. Despite the high gain antennas and ARR preamplifiers, we started receiving the birds around 8 degrees of elevation. During the gear test at home, we were able to easily work the birds from AOS to LOS.

Even though, the horizons were less than desired, and we had to tear down the station on Sunday morning (which caused us to miss the afternoon FO-29 and AO-7 passes) the long hours of faithful operating paid off. The final tally for the AMSAT Field Day was 80 points and for the ARRL Field Day,51 points.

AMSAT-NA Board of Directors Ballots in the Mail

Ballots have been mailed to AMSAT-NA members in good standing, and must be returned to the AMSAT-NA office by September 15, 2015, in order to be counted. Those outside North America were sent by air mail.

If you have not received your ballot package in a reasonable time for your QTH, please contact the AMSAT-NA office. Your completed ballot should be sent as promptly as possible, and those from outside North American preferably by air mail or other expedited means.

This year there are eight candidates:

- Barry Baines, WD4ASW
- Jerry Buxton, N0JY
- Steve Coy, K8UD
- Drew Glasbrenner, KO4MA
- Mark Hammond, N8MH
- EMike McCardel, KC8YLD
- Bob McGwier, N4HY
- Bruce Paige, KK5DO

The four candidates receiving the highest number of votes will be seated as voting Board Members with two year terms. The two candidates receiving the next highest number of votes will be non-voting Alternate Board Members with terms of one year. Please vote for no more than four candidates.

Please take the time to review the candidate statements that accompany the ballot and determine who you wish to see on the Board. Election of Board members is both an obligation as well as an opportunity by our membership to help shape the future direction of AMSAT-NA.

Alan Biddle, WA4SCA
AMSAT-NA Corporate Secretary

Jerry Buxton, N0JY - AMSAT Vice President Engineering
n0jy@amsat.org

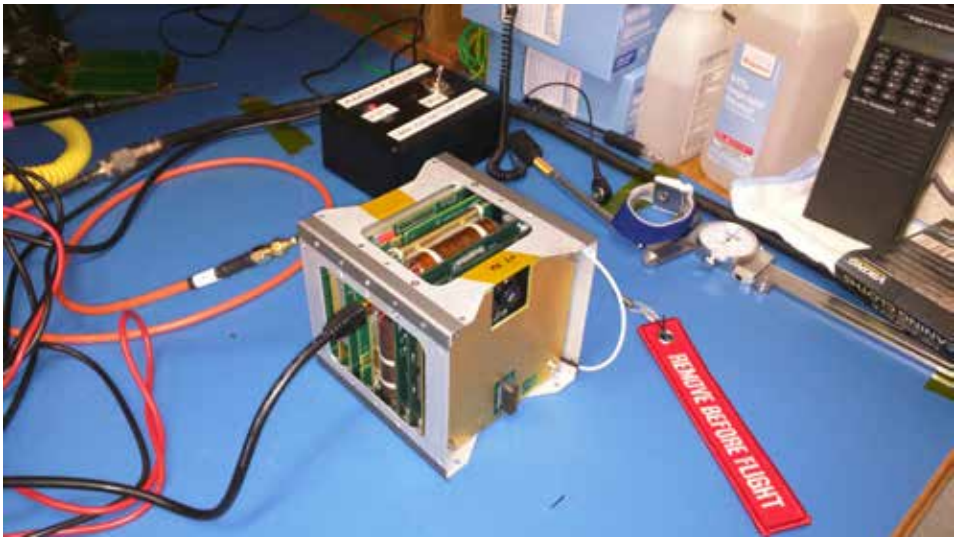
AMSAT Engineering is blessed to have so much to do that we really still need more help! See the end of this article for more information.

On the Fox-1 front, Fox-1A still stands (at this writing, July 9, 2015) for a late September launch. Yes, that's not very specific but please remember that the launch is an NRO/OSL classified mission so they're not giving out any specific date yet. Along that line of thought, it will be likely that Keplerian elements will not be available until just prior to, or perhaps even after, the launch. We will make them available as soon as we are given permission!

Fox-1C has been in the engineering model state for a little over a month which in actuality serves as a dual Fox-1C/D Engineering Model (EM) because of their similarity. Specifics on the progress include a software update to the Virginia Tech camera experiment that I installed this week which solves the blank lines (you might have seen that at Dayton) and adds the Earth sensing logic – our NOAA license for imaging on the Fox-1C/D cameras requires that we image Earth only, no "space shots". The logic will determine if the image has enough light to be Earth else the image is not downlinked. We also have the MPPT working and are conducting tests both on the bench and in the EM. This design is a derivative of the Fox-2 design that students at Rochester Institute of Technology undertook for AMSAT. Bryce and Brent Salmi who were on the original RIT team and are now Fox-1 Team members worked out the design. The University of Iowa HERCI experiment for Fox-1D is being tweaked on the bench and will be added to the EM for system testing soon. And finally, the L band uplink "DOWNSHIFTER" is about to be sent for the first PCB turn and will then go into the EM for testing.

RadFxSat (a.k.a. internally as Fox-1B) was offered a chance for a November 2016 ELaNa launch which Vanderbilt University accepted. This places RadFxSat on a list for that opportunity, based on its relative ranking in the ELaNa selections vs. any others that might accept the orbit. No word on whether RadFxSat will surely be on that launch has been received.

Fox-1E is still under consideration to fly with a linear transponder. This project is basically an opportunistic afterthought on using leftover Fox-1 parts and adding a linear transponder that is in the design stages.



Fox-1C EM in the "Fox Labs"

This rests entirely on whether we may get a particular launch opportunity that has been brought to us. That launch is not certain, so whether the project goes ahead depends on the availability of the launch.

News of some wonderful opportunities came out at Dayton this year, and we are in hot pursuit of several missions that line up to bringing higher orbits and greater coverage as well as long range experimentation. The design of these missions is pushing toward a common band plan and ground station design that can be used on these and future missions for some time to come. This also stakes out amateur radio presence worldwide in the microwave bands, bands that we are in jeopardy of losing very soon if they aren't used.

Phase 4B (often referred to as the "Millennium Project" in reference to the name of the company that is building the satellite) Millennium Space Systems, gives us an opportunity to fly a payload on a geosynchronous satellite being built for the USAF by Millennium Space Systems. While there are many administrative details being worked on to secure the mission, I can only say that the opportunity is real but it has not yet been sealed. From the engineering point of view, we will be flying an SDR payload with uplink in the 5 GHz amateur satellite band and downlink in the 10 GHz amateur satellite band that will provide several MHz of digital and analog capability using CDMA uplink and TDMA downlinks. A major focus of the capability will be on emergency communications capability, with concurrent development of ground stations that allow portability into disaster areas providing various capabilies, depending on size and power, from simple messaging to streaming video and data. This development plan carries over to the casual user providing multiple means of communications and experimentation through P4B using relatively small (less than 1 meter or DSS size) antennas that will also be compatible with the other high orbit satellites being designed. Phase 4B will initially be positioned over the western hemisphere (Region 2) but, during the course of its primary mission, it may be available to radio amateurs in other areas of the world while still being operated by AMSAT-NA. Engineers are already at work designing terrestrial versions of the systems in development and testing of the hardware and software to be used. There will certainly be more exciting engineering and other news to follow as this project progresses!

Another mission that AMSAT undertook earlier this year is a partnership with Ragnarok Industries where we will provide the communications package for a 6U CubeSat as part of the NASA Cube Quest Challenge Lunar Derby. While there are several objectives in the challenge, our focus is on providing the communications for spacecraft command and control. As well there's the challenge of receiving the most data and highest speed downlink from the spacecraft in lunar orbit. While the distances involved with this project are obviously much more difficult to overcome for hobby communications, with the offer that the satellite will be turned over to AMSAT for use as an amateur radio satellite after the Challenge is completed, we are pursuing the ability to at least use the common 5

and 10 GHz frequencies and ground station development to allow the amateur satellite community access to the satellite after the mission. In concert with this development, we have had a desire to pursue our own 6U HEO opportunity at least since last year. The the similarities in the Cube Quest Challenge (CQC) and a 6U GTO/HEO mission make sense when working toward the development of systems that can be used in both. Again here, the common ground station development comes into play with the purpose of supporting P4B, CQC, and HEO.

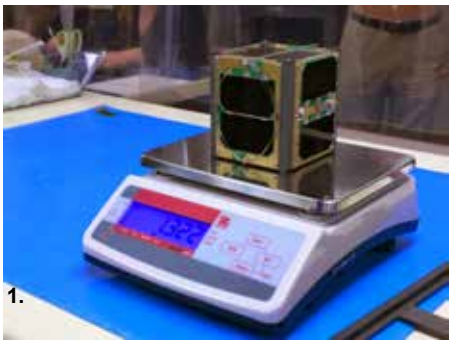
At the end of May the Design the Next AMSAT Satellite submissions closed. We received one submission, from Eric Skoog K1TVV, which is being reviewed. Interestingly, at the time that I offered that program last Symposium, the possibilities of a P4B and Lunar mission were not on anyone's scope. So the focus was on LEO opportunities and I intend to pursue LEO opportunities as well as these new projects. Development of systems and capabilities especially in the CubeSat format make sense and opportunities for LEO are abundant. With the partnerships we have developed with universities through the Fox-1 program, and the exciting STEM education possibilities they bring, it's a natural fit to continue to pursue low-cost ways to get more amateur radio satellites in orbit. While these new projects will affect the course and speed of the continuing LEO projects as a natural outcome of volunteers and resources vs. time and opportunities, we will still press ahead with all of these projects.

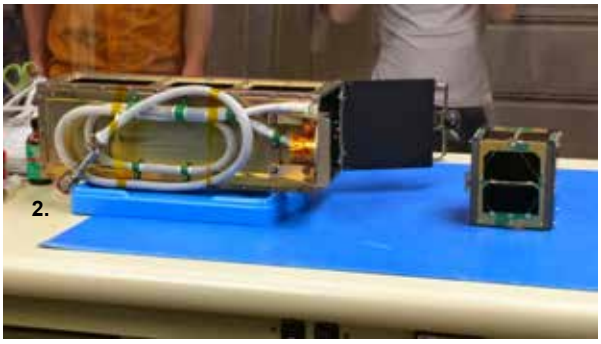
Life size Millennium Space Systems AQUILA M8 P4B ride - "it sure ain't no CubeSat!"

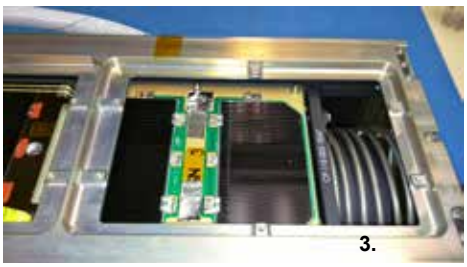
And that brings me back to the opening paragraph, DO YOU WANT TO HELP? We have an immediate need for a thermal engineer, as our long time contributor Dick Jansson KD1K recently retired. If you are, or know a thermal engineer, please let us know! In addition, to pursue these various projects, we are also in need of experienced engineers in the fields of microwave RF, spacecraft mechanical, attitude determination and control, propulsion, and software (especially GNU radio). But the hardware is only part of the equation, we are also looking for hams experienced in testing, documentation, and project management. In considering volunteering, you must be a U.S. Person and above all PLEASE be sure that you have a fair amount of time to contribute. I will never fault anyone for honestly saying "I don't have time to do a job thoroughly" rather than to step up and then not deliver. Yes, this is a hobby, and it is all volunteer, but the deadlines and requirements of working in the hitch-a-ride space industry make it such that we need committed individuals to work reliably as a team and not let each other down. Thanks!

Hmm, as I said in my last column it and it becomes more so now, "These are exciting times, indeed!"

AMSAT Vice President Engineering, Jerry Buxton, N0JY in clean room gear during Fox-1A integration.







More photos from the Fox-1A cubesat integration at Cal-Poly in San Luis Obispo, California during the week of March 23, 2015.

Photo 1. Acceptance testing included meeting mechanical specifications such as weight, length, width, height.

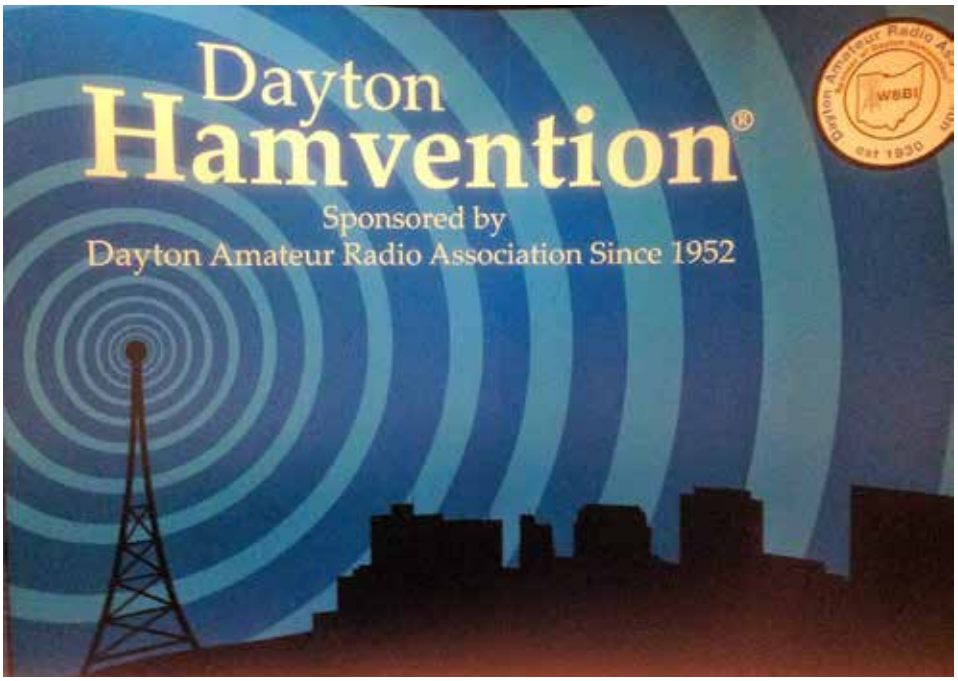
Photo 2. Fox-1A ready to be loaded into the P-POD cubesat deployer.

Photo 3. When a control signal releases the trap door on the front of the P-POD the internal spring pushes the cubesats out into space.

Keith Baker, KB1SF / VA3KSF
kb1sf@amsat.org

AMSAT's presence at the annual Dayton Hamvention®, sponsored by the Dayton Amateur Radio Association (DARA) is always a mixture of the new and surprising as well as a chance to meet and greet old friends. And this year's Hamvention was no exception. Clearly, there is nothing else quite like "Dayton" in the fascinating world of amateur radio.

As in past years, AMSAT's presence at Dayton this year started with a visit to AMSAT's storage locker on the Thursday before the event to upload various booth items to a rental van. Then came the absolutely *massive* logistical challenge of unloading, re-assembling and setting up AMSAT's various booths at the HARA Arena complex. Also, as in past years, AMSAT occupied a number of booth spaces in the Ballarena area of the HARA complex. Our booth was located in the vicinity of the extensive ARRL Expo area and just a quick walk from our outdoor AMSAT satellite demonstration area that the Hamvention organizers graciously set up for us every year in the adjacent parking lot.



Once again in 2015 AMSAT had strong presence at the annual Dayton Hamvention®. Our display featured AMSAT's satellites, live satellite operating demonstrations, and the information and sales booth. (Photos by the author.)

Once again at this year's Dayton Hamvention, AMSAT had an abundance of new (and older) hardware on display as well as some new printed material and fashions to add to AMSAT's continuing line of wardrobe items.

New fashion accessories included new AMSAT FOX Golf and T-shirts as well as FOX hats and stickers. Other new (and older) offerings included Gould Smith's updated *Getting Started with Amateur Satellites*, an updated 2015 *Amateur Satellite Frequency Guide,* along with the very latest editions of *SATPC32* and *MacDoppler PRO* tracking software. We also had Elk and Arrow antennas along with LVB Trackers with the latest firmware on hand to offer Hamvention attendees.

The AMSAT engineering area this year once again included a structural prototype of the FOX-1 satellite, a working model of FOX-1A's transponder and an "expanded" prototype of the FOX-1C spacecraft.

Another hands-on opportunity that was available was the satellite demonstrations that took place right outside of the Ballarena entrance. Led by Keith Pugh, W5IU and Roger Ley, WA9PZL and supported by numerous other AMSAT volunteers, a number of contacts were made on various LEO satellites. The demo provided an

Shown above is Doug Papay, KD8CAO in the Beginner's Corner. This was a good place to introduce amateur radio operators to the excitement of amateur radio in space. We could answer basic questions about radios, antennas, operating techniques, tracking software for satellite operation. We could also give visitors an introduction to the other features in the AMSAT booth and let them know where to find our outdoor live demonstration area.

,,, text continues on page 16 ...

Staffing the booth above are (L-R) Steve Belter, N9IP; Keith Pugh, W5IU; and Phil Smith, W1EME. AMSAT had an abundance of new (and older) hardware on display as well as some new printed material and fashions to add to AMSAT's continuing line of wardrobe items. New fashion accessories included new AMSAT FOX Golf and T-shirts as well as FOX hats and stickers. Gould Smith's 2015 edition of *Getting Started with Amateur Satellites* book, and an updated 2015 *Amateur Satellite Frequency Guide* were available. If you missed getting these at Dayton they are still available in the AMSAT on-line store at: http://store.amsat.org/catalog/

AMSAT had the very latest editions of SATPC32 and MacDoppler PRO tracking software. We also had Elk and Arrow antennas along with LVB Trackers with the latest firmware on hand. A working model of Mark Spencer's (WA8SME) WRAPS rotor system was on display. The WRAPS printed circuit board is also still available in the AMSAT on-line store.

Thanks to Our 2015 AMSAT Booth Volunteers

Our crew, many of whom later spent a good portion of their Dayton 2015 experiences manning AMSAT's booth, included

- Don Agro, VE3VRW
- Barry Baines, WD4ASW
- Kate Baker, KB1OGF
- Keith Baker, KB1SF
- Frank Bauer, KA3HDO
- Steve Belter, N9IP
- Alan Biddle, WA4SCA
- Jonathan Brandenburg, KF5IDY
- Jerry Buxton, N0JY
- Tom Clark, K3IO
- Ed Collins, N8NUY
- Steve Coy, K8UD
- Burns Fisher, W2BFJ
- Drew Glasbrenner, KO4MA
- Mark Hammond, N8MH
- Steve Kenwolf, WH6BSZ
- Michael Kirkhart, KD8QBA
- John Kludt, K4SQC
- Ed Krome, K9EK
- Roger Ley, WA9PZL
- Chet Latawiec, VE3CFK
- Steve Lubbers, KE8FP
- Nancy Makley, KC8GYW
- Steve May, W5IEM
- E Mike McCardel, KC8YLD
- Ken Nichols, KD3VK
- Doug Papay, KD8CAO
- John Papay, K8YSE
- Art Payne, VE3GNF
- Doug Phelps, K9DLP
- Larry Phelps, K4OZS
- Chuck Pinkham, K3PER
- Keith Pugh, W5IU
- Bill Reed, NX5R
- Martha Saragovitz, Ofc Mgr.
- Jay Schwartz, WB8SBI
- Mike Seguin, N1JEZ
- John Shew, N4QQ
- Phil Smith, W1EME
- Mark Steiner, K3MS
- Paul Stoetzer, N8HM
- Dave Taylor, W8AAS
- Bob Thompson, VA3RD
- Mike Young, WB8CXO

All served under the expert leadership of our "Booth Czars" Steve,N9IP, and Alan, WA4SCA, and of course, our hard-working AMSAT Office Manager, Martha.

Hope, KM4IPF with Fox-1

Dr. Ahmed Hamad AL-Mohanadi, A71DR, with Fox-1

L-R: AMSAT President Barry Baines, WD4ASW with ARRL's Steve Ford, WB8IMY , and ARRL President Kay Craigie, N3KN

L-R: AMSAT Vice President Engineering Jerry Buxton, N0JY with Steve Ford, WB8IMY

opportunity for people attending Hamvention to actually make satellite contacts themselves and to also gain a better understanding of what constitutes an amateur satellite station.

As in past years, AMSAT sponsored a variety of social events in Dayton. In the last few years, AMSAT members and friends have been gathering at around 6:30 at the Tickets Pub and Eatery in Fairborn on Thursday evening after the AMSAT booth is assembled. The Ticket's management graciously provides us a separate area in the pub where everyone has a chance to relax and refresh after the day's efforts.

Then, once again on Friday night, over 100 members and guests attended the joint TAPR/AMSAT dinner held at the Kohler Presidential Banquet Center in Kettering. We began with cocktails and conversation, followed by an excellent buffet dinner. TAPR President Steve Bible, N7HPR, served as moderator of this year's event. He reminded us of the TAPR/AMSAT community members who had become Silent Keys over the past year.

AMSAT President Barry Baines, WD4ASW, also introduced Thani Ali Al-Malki of Qatar Satellite Company and Ahmed Hamad Al-Mohanadi, A71DR, of the Qatar Amateur Radio Society. Thani briefly brought banquet guests up to speed on their plans to integrate an amateur radio transponder into their next Geostationary satellite (EShail II). Afterwards, the featured speaker, Michael Ossmann, AD0NR, guided us through a uniquely personal history of his life as a computer "nerd" and, later, as a hacker-turned-ham.

The AMSAT Forum this year included six speakers, covering the usual topics about AMSAT operations and plans, but also new developments for future spacecraft. The 2 hrs and 15 minutes allotted to the forum remains one of the Hamvention's longest. AMSAT Secretary Alan Biddle, WA4SCA, served as the forum moderator and, as in past years, the venue was filled to overflowing with several people standing around the side of the room.

Presenters and their topics included:

Barry Baines, WD4ASW, AMSAT's President highlighted current activities within AMSAT and discussed some of the challenges facing the organization.

Frank Bauer, KA5HDO, AMSAT Vice President for Human Spaceflight provided a report on recent operations and planned developments for ARISS (Amateur Radio

on the International Space Station).

Jerry Buxton, N0JY, AMSAT's Vice President for Engineering discussed upcoming launches of AMSAT-NA's four FOX cubesats along with some exciting new developments**.**

Drew Glasbrenner, KO4MA , AMSAT's Vice President for Operations shared details about a number of current amateur radio satellites as well as those planned for launch within the next few years.

Tom Clark, K3IO, AMSAT's President Emeritus reported on the organizations' recent formation of a "Skunk Works" and discussed some innovative research and development activities taking place within that effort.

E. Mike McCardel, KC8YLD, AMSAT's VP of Educational Relations, discussed the resources and equipment which supports the educational goals of AMSAT.

After the talks, Barry, WD4SAW, engaged the audience in a brief question and answer session.

Also present at this year's Hamvention in the ARRL Expo area was Edward Michael ("Mike") Fincke, KE5AIT (Colonel, USAF, Retired). Mike operated the ham equipment aboard the International Space Station (ISS) as part of the Expedition 9 and 18 crews, making radio contacts with students, teachers, and the general Amateur Radio community.

One of the spinoffs of Hamvention is that DARA uses the proceeds from their surplus to support other amateur radio efforts and organizations. On Saturday afternoonn, DARA President Don DuBon, N6JRL along with Past Hamvention General Chairman (and current DARA Treasurer) Mike Kalter, W8CI presented a donation check for $5,000.00 to AMSAT President Barry Baines. The donation was in support of AMSAT's efforts at keeping amateur radio in space. DARA's continuing strong support of AMSAT's satellite program, not only monetarily, but also by their gracious and accommodating efforts to support AMSAT logistically at Hamvention, reflects their continuing recognition of the importance of our projects to all of Amateur Radio.

This was another highly successful Hamvention for AMSAT, aided by yet another solid Hamvention turnout. Official attendance at this year's show was again just shy of 25,000. Clearly, the Dayton Hamvention remains "*the* place to be" to rub elbows with the movers and shakers in Amateur Radio today.

Of course, for AMSAT as with most other exhibitors, Hamvention was not over until *long* after the attendees were well on their way home with their new "goodies". Finishing up the show included packing and shipping satellite components and materials, as well as breaking down the booth and returning its various components to our local storage facility to await Hamvention 2016.

And, once again, AMSAT will be there. Make your plans *now* to join us!

Astronaut Edward Michael ("Mike") Fincke, KE5AIT (Colonel, USAF, Retired). visited the AMSAT booth. L-R in the photo are Ken Ransom, N5VHO; EMike McCardel, KC8YLD; Mike Fincke, KE5AIT; Bob Inderbitzen, NQ1R - Marketing Manager ARRL; and Dave Taylor, W8AAS. (Photo by Bob Inderbitzen)

AMSAT at Dayton 2015 Photo Gallery

One of the features of AMSAT gatherings is the opportunity to visit first-hand with satellite components. The University of Iowa HERCI experiment for the Fox-1D mission was on display at the Tickets Pub gathering and at the AMSAT booth

L-R: Michael Kirkhart, KD8QBA and Paul Stoetzer, N8HM enjoy an eyeball QSO during the annual AMSAT gathering at the Tickets Pub and Eatery

L-R: AMSAT Vice President Engineering, Jerry Buxton, N0JY; Dayton Booth Chairman Steve Belter, N9IP; and Booth Co-Chairman, Alan Biddle, WA4SCA, get a chance to catch their breath after the booth setup

TAPR President, Steve Bible, N7HPR introduced Michael Ossmann, AD0NR, as the featured banquet speaker

The featured speaker at the annual TAPR/AMSAT Banquet was Michael Ossmann, AD0NR who guided us through a uniquely personal history of his life as a computer "nerd" and later, as a hacker-turned-ham

Thani Ali Al-Malki of Qatar Satellite Company brought banquet guests up to speed on their plans to integrate an amateur radio transponder into their next Geostationary satellite (EShail II)

DARA President Don DuBon, N6JRL presented a donation check for $5,000 to AMSAT President Barry Baines. The donation was in support of AMSAT's efforts at keeping amateur radio in space

The AMSAT engineering area this year once again included a structural prototype of the FOX-1 satellite, a working model of FOX-1A's transponder and an "expanded" prototype of the FOX-1C spacecraft

Tom Clark, K3IO, AMSAT's President Emeritus reported on the organization's recent formation of a "Skunk Works" and discussed some innovative research and development activities taking place within that effort. The slide in the background discusses AMSAT's rideshare geosynchronous opportunity

Led by Keith Pugh, W5IU and Roger Ley, WA9PZL and supported by numerous other AMSAT volunteers, a number of contacts were made on various LEO satellites. The demo provided an opportunity to actually make satellite contacts themselves and to also gain a better understanding of what constitutes an amateur satellite station

Michael Kirkhart, KD8QBA explains the equipment and operating techniques to visitors in the outdoor demonstrations area for an upcoming satellite pass. Keith Pugh, W5IU is in the background preparing the radio equipment

Art Payne, VE3GNF demonstrated construction techniques for homebrew satellite antennas. Art's homebrew "Gizmo" rotor, shown on the left, was featured in an article in the March/April 2015 *AMSAT Journal*

Paul Stoetzer, N8HM
n8hm@amsat.org

DX and grid activations have continued to drive satellite activity over the past several months. Lots of new calls are heard on a daily basis and it is an exciting time to get on the air and operate!

Upcoming Satellite Operations Page

On April 1, 2015, AMSAT debuted a new web page dedicated to posting up to date information about grid activations and DX trips involving satellite activity. The page is located at

http://www.amsat.org/?page_id=3921

If you are planning to include satellite operations on your DXpedition or planning a grid activation anywhere in the world, please email the details to n8hm@amsat.org. Be sure to follow @AMSAT on Twitter for notifications of updates to this page as well.

UT1FG/MM

Captain Yuri Bodrov, UT1FG/MM, concluded his voyage aboard the M/V *Greenwing* in early July. Between January 17th and July 7th, he likely put 200+ grids on the air during an extensive journey that saw three crossings of the Atlantic Ocean, two transits of the Panama Canal, a journey up the Pacific Coast of North America, and a couple of trips up and down the East Coast of North America. Your author was able to work him in 131 grid squares and 21 grid fields, from IO90 in the English Channel to CN50 in the Pacific Ocean and south to EJ96 near the Pacific side of Panama Canal. Many satellite operators lost a lot of sleep in the first six months of the year working him on early morning passes of FO-29 and AO-7, but it is a lot of fun to track his progress and pick up grid squares that may never see another amateur satellite operator cross them again.

VP2MKV

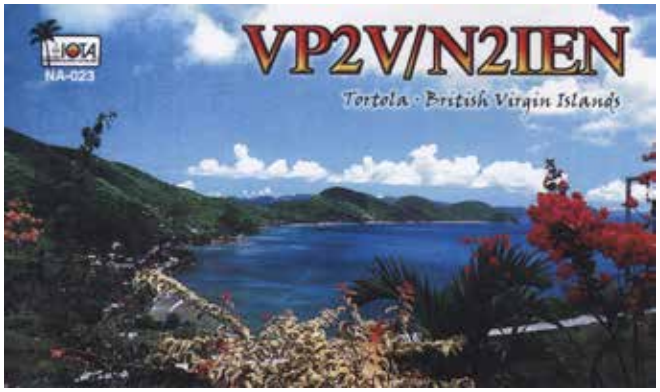
A DXpedition to Montserrat (VP2M) occurred June 10-20, 2015. Jim White, WD0E, was the primary satellite operator and reports:

Jim, WD0E, and three team members from the Denver area traveled to Montserrat (VP2M) for an expedition June 10 through 20, 2015. We made 44 satellite contacts on FO-29 using an ICOM 910 and arrow. Barry, N0KV and Ken, W0ETT did the antenna pointing work while Jim operated. We had no trouble hearing ourselves or others on the bird most of the time. 44 contacts were made during the 8 days of operating. 42 of the contacts were with US stations.

Conditions at the Gingerbread Hill villa were at times very difficult. The passes occurred at the peak of the hot part of the day with sun beating down and very high humidity. We drank 8 to 10 bottles of water a day because we were always sweating and the wind sucked the moisture out of us. After the first pass, when using the second

(right) Map showing the grid squares where UT1FG/MM was worked by the author during 2015 (produced with GCMWin)

(left) Jim White, WD0E, operates as VP2MKV from Montserrat in June 2015.



(above and below) QSL cards from Patrick Dolan, N2IEN's trips to Haiti and the British Virgin Islands in 2015

floor deck, it was clear that passes to our east would be blocked by the top floor of the villa. We moved to roof deck where the building wasn't in the way but the wind was strong enough at times to slide the plastic table across the deck. Good headsets and a splitter so the antenna pointer could peak on signals were essential.

We had hoped to catch some European stations on passes where there was a mutual window and listened very carefully for them. But all passes to our east yielded no signals but us through the bird. We also heard no South America even when tuning the entire pass band during the times the satellite was to our south. We operated only the afternoon ascending node passes since the descending passes occurred in the small hours of the morning and we expected no one would be on. In total, we heard no other signals but ourselves on nearly half the passes we operated.

We had published the expedition well in advance on the usual DX outlets and on AMSAT-BB including a note that we would transmit on 145.925, and a request that stations transmit there also. The idea was to make it easier for us, operating in haste to work as many stations a possible, to find stations and stay with their Doppler shift as the pass geometry changed. This worked very well for stations who followed that procedure. The most they were away from where we heard ourselves was about 10 KHz and their rate of Doppler was easy to follow. A few stations didn't do that and called us while sweeping their uplink around. Those were much harder for us to stay with and get a good call sign and I'm sure we missed a few we couldn't keep up with.

At times following the bird was difficult. The villa sits on a hillside surrounded by other hills and is not aligned N-S, E-W. In fact nothing on Montserrat is lined up with the compass. We used Polaris the first night while assembling HF antennas in the dark to find north then mentally estimated the satellite AOS and LOS. A couple of times we set out objects on the deck to mark those and TCA, but once we had AOS tracking was by peaking the signals. And that stuff blew away most the time anyway.

The expedition as a whole was a great success with over 9,000 QSOs on HF and over 600 on 6 meters. We had some great openings on 6 into Europe and worked nearly every state in the US using 500W to a 6 element Yagi. All contacts will be uploaded to LOTW by the time this goes to press. Special color QSL cards are also available for an SASE.

We posted stations worked on satellite to AMSAT-BB right after each pass – when the intermittent Internet connection allowed. That seemed to be a success.

We had some fascinating multipath on both the uplink and downlink when the satellite was less than 2 degrees high over the long stretch of ocean to the west. There may have been some tropo involved also. The villa is about 500 feet above the water and about a quarter mile from the edge of the island. As we tracked the sat across that low arc we heard very large changes in signal strength about every 10 seconds as the result of constructive and destructive multipath.

Lessons learned: The pass Al/EL angles we printed out a few days before departing the US were fine for the first 4 or 5 days then we noted the AOS came as much as 3 or 4 minutes early by the end of the expedition. That's a large error and more than I recall every seeing when operating from the home station. Long AC extension cords to a 12VDC supply, in a place where the AC voltage fluctuates during the day, results in a voltage drop that can cause the power supply to trip off if too much current is drawn. As long as we limited the 910 to about 20W output we managed around that problem. A rock to hold down the logging paper is essential. It's not worth operating passes when the footprint of the satellite is only Africa and the Atlantic Ocean. When your antenna pointing partners have little experience with satellite tracking a real-time footprint display is helpful, when you have tracking program on a laptop that can be seen in the bright sun. An Arrow on a tripod is OK, but if the tripod is light duty to save shipping weight and the wind blows it over no matter how you try to secure it, it's probably just as easy to hold it by hand. If you ship antennas and/or equipment do as much pre-arrangement with a customs broker at the distant end and return port of entry as you can. We lost a day and a half and spent an extra $198 in customs because we had one item in the crate that was not on the list. Just plan to be hassled, be pleasant and patient and it goes smoother. Customs agents are looking for drugs and people trying to sneak stuff in or out; keep that in mind.

Thanks to all those we worked and particularly to those with suggestions. Special thanks to Drew, KO4MA, for his help and advice before the trip. We are already planning another expedition for 2016, perhaps to somewhere cooler.

VP2V/N2IEN, HH2/N2IEN, and OY/N2IEN

Patrick Dolan, N2IEN, followed up on his February activation of Saint Barthélemy (FJ) on SO-50 with two separate activations of the British Virgin Islands (VP2V), in early March and late April, and Haiti, in early April. In early July, he participated in a DXpedition to the Faroe Islands, primarily for the IARU HF World Championship, but he was also able to work a few stations on FO-29 using his IC-7000 and Arrow antenna.

Grid Expeditions

Many other grid expeditions occurred over the last several months. WD9EWK, W5PFG, KX9X, N8RO, KG5CCI, KO4MA, and others all activated several rare grids. Thanks to all for their efforts to put rare grids on the air!

Request for Submissions

This column is meant to be partially supported by reader input. Please send any reports, observations, or photographs for future columns to my e-mail address which is:

n8hm@amsat.org.

Patrick Dolan, OY/N2IEN, working a pass of FO-29 from the Faroe Islands in July 2015 using an Icom IC-7000 and an Arrow antenna.

Erling Johnsen, LA4FPA's satellite antenna overlooking the North Sea from Vigra Island, Norway in July 2015.

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Visit the AMSAT On-Line Store for details on the updated LVB Tracker Box: http://store.amsat.org/catalog

AMSAT Fox-1C $125,000 Launch Initiative Goal ... Your Help is Needed!

AMSAT is excited to announce a launch opportunity for the Fox-1C Cubesat. AMSAT has teamed with Spaceflight for integration and launch utilizing Spaceflight's SHERPA system to a sun-synchronous orbit in the third quarter of 2015.

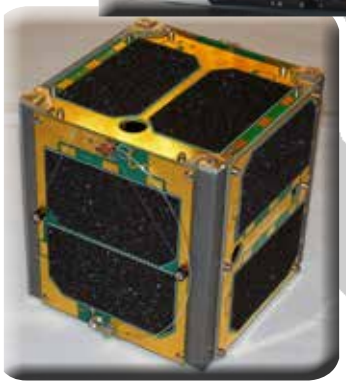
Fox-1C is the third of four Fox-1 series satellites under development, with Fox-1A and RadFXsat/Fox-1B launching through the NASA ELaNa program. Fox-1C will carry an FM repeater system for amateur radio use by radio hams and listeners worldwide. Further details on the satellite and launch will be made available as soon as released.

AMSAT has an immediate need to raise funds to cover both the launch contract and additional materials for construction and testing for Fox-1C. We have set a fundraising goal of $125,000 to cover these expenses over the next 12 months, and allow us to continue to keep amateur radio in space.

Spaceflight's SHERPA will deploy multiple cubesat payloads on-orbit

Spaceflight's SHERPA System

ISIS QuadPack Nanosatellite Dispenser



Your help is needed to get the AMSAT Fox-1C 1U Cubesat launched on the Spaceflight's initial SHERPA flight in 3Q 2015.

For the latest news on Fox-1 watch our website at www.amsat.org, follow us on Twitter at "AMSAT", or on Facebook as "The Radio Amateur Satellite Corporation" for continuing news and opportunities for support.

Donations may be made through the AMSAT webpage at www.amsat.org, by calling (888) 322-6728 or by mail to the AMSAT office at 10605 Concord Street, Kensington, MD 20895, USA. Please consider a recurring, club, or corporate donation to maximize our chance of success with this mission.

AMSAT President's Club
Support Fox-1C ... Join Now!

Contribute to AMSAT directly through easy, automatic charges to your credit card. Since AMSAT is a 501(C)(3) organization donations may be USA tax deductible. (Check with your tax advisor.) To join contact Martha at the AMSAT Office by phone (888) 322-6728 in the US, or (301) 822-4376; e-mail martha@amsat.org.

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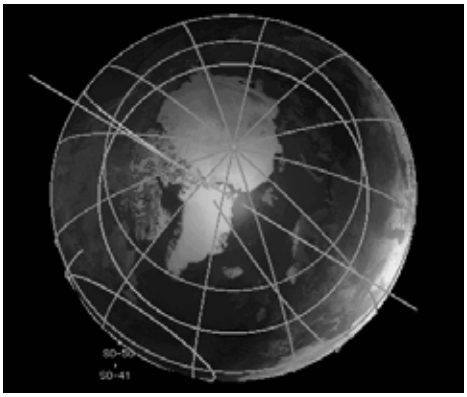

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ARISS Announces New Challenge Coin

The Amateur Radio on the International Space Station (ARISS) program has kicked off a fund-raising program, and it's offering an ARISS Challenge Coin as a token of appreciation to those who contribute $100 or more.

ARISS relies on resource support from NASA, ARRL, AMSAT, and individual donors and volunteers to ensure day-to-day operation of its programs and to pay for spaceflight equipment certification. In light of budget cutbacks at NASA over the past 2 years, the funding needed to cover operational expenses down the road has become more uncertain, however, and ARISS leadership initiated the fund-raising effort with the goal of securing greater financial stability.

Plans are under way to develop a new, higher-power amateur radio station for the ISS Columbus module. A new radio system will improve communication capability for students scheduled to participate in ARISS educational contacts and related activities.

Each ARISS contact offers the opportunity to inspire young people through ARISS's unique window into space exploration activities, opening the horizon of possibilities of a career in a STEM field,

Individuals may donate to ARISS online via the AMSAT website (select the "ARISS Donate" button). AMSAT is contributing the necessary personnel resources to handle gifts to ARISS. Individuals contributing $100 or more will receive the new ARISS Challenge Coin. Corporate donors should contact Frank Bauer at ARISS@arrl.org.

Operating satellite on a submarine! Shown are Dave, WN9Q at the mike and Ken, KD9AQM at the antenna on the deck of the USS Cobia, operating as NB9QV on June 6. Contacts were made on SO-50. The USS Cobia Amateur Radio Club's HF operation was set up below deck and netted over 1100 contacts.

iCubeSat 2016 - the 5th Interplanetary CubeSat Workshop
24-25 May 2016
Oxford, United Kingdom
www.iCubeSat.org

iCubeSat 2016, the 5th Interplanetary CubeSat Workshop, will address the technical challenges, opportunities, and practicalities of interplanetary space exploration with CubeSats. The workshop provides a unique environment for open wide ranging practical collaboration between academic researchers, industry professionals, policy makers and students developing this new and rapidly growing field. The full call for papers and presentations from previous workshops at Imperial, Caltech, Cornell and MIT can be found at:

http://www.iCubeSat.org

Israel's Duchifat-1 Cubesat Open for Users

Shamai Opfer 4Z1WS
David Greenberg 4X1DG

The Israeli student satellite, Duchifat-1, is an experimental and educational spacecraft developed and built by Israeli young students of secondary schools at the Space Laboratory of the Herzliya Science Centre (4X4HSC). The project was directed by Dr Ana Heller with support from the Herzliya city municipe and the Israeli Amateur Radio Club Organization. The main function of the satellite is to transmit real-time or stored information via radio amateur packets from a Low Earth Orbit (LEO) using the Automatic Position Reporting System (APRS) protocol.

Duchifat1, launched 1 year ago, was supposed to have onboard a "standard" space APRS transceiver operating on 145.825MHz. That would have made the satellite compatible with ISS, other APRS satellites and APRS-IS.

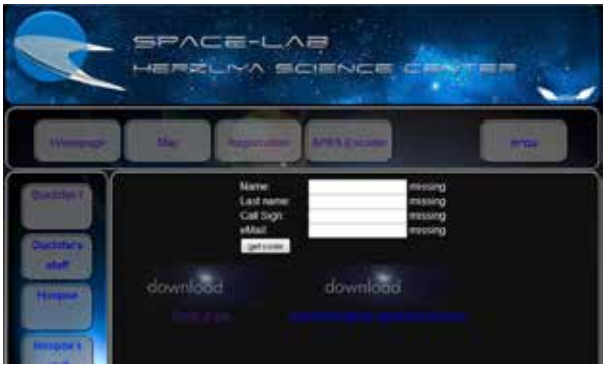
Unfortunately, a short time before launch, we realized that technically we couldn't keep the intended 145.825 MHz transceiver in the final satellite configuration but we still wanted to make some contribution to amateur radio in space.

After a quick research we discovered that the 2nd transceiver onboard Duchifat1, the ISIS (Netherlands) TRXUV planned for Duchifat1's command and telemetry can be programmed to also accept APRS packets limited to 14 characters long. Also, the downlink digital modulation was not the common space APRS of 1200 bd AFSK but 1200bd BPSK, and the uplink frequency is in the UHF band.

We came up with the idea of supporting compressed APRS, and instead of the standard digipeater, we implemented a kind of store and forward function in which the satellite collects packets during its flight in orbit and the students of Herzliya Science Center will download those packets and display them on a world map in a web site programmed by them.

We announced a few weeks ago the opening of this service and put on our web site detailed instructions on how to use the Byonics TinyTrak4 (TT4) tracker, with or without GPS to generate packets in the required format that Duchifat1 will accept. So far, TWO pioneers used this service. THANKS PETER & MIKE!

While the TT4 solution is still the best we know for sending your actual live position to Duchifat1, we are happy to announce the 'APRS Encoder', a new tool in our web site that can generate for you the COMPRESSED APRS packet for Duchifat1.



First step: Please register as a Duchifat-1 user.

Next step: Enter your location data to generate a compressed APRS packet which you can copy/paste into your packet software.

The input for the new APRS Encoder is the station's (or nearby) coordinates set that can be obtained from Google Maps, so this solution is naturally adequate for stationary base stations, while mobile stations should still use the Byonics TT4.

The output of the APRS Encoder is a 14 character long Compressed APRS packet that can be converted to 1200 baud AFSK with a hardware TNC or software like MIXW – just copy the 14 chars string and paste it into the MIXW window. The MIXW software should be set to Packet mode using the most common "VHF 1200 baud (Standard 1200/2200Hz)" setting.

All the details on the satellite, the registration and the APRS Encoder are at :

http://www.h-space-lab.org

Please read all the documentation in the site. We wish you all good luck and enjoy our satellite!

73 from 4X4HSC team: instructors 4Z1WS and 4X1DG, and the students at 4X4HSC!

Dutchifat-1 Frequencies and Modes	
Downlink	145.980MHz +/-3 KHz for Doppler
Uplink	435.220 MHz +/-9 KHz for Doppler
Morse Beacons	Morse beacon at satellite wake-up: Shalom de 4X4HSL Duchifat1- Herzliya Science Center sat Morse beacon every 1 minute (15 words per minute): hi de Duchifat
Telemetry	AX.25 BPSK 1200baud every 20 seconds

Investigation of the International Arms Export Control Act of 1976

Elizabeth Garbee, KC0OTR - egarbee@asu.edu
Arizona State University

I am a PhD student at the Consortium for Science Policy and Outcomes at Arizona State University. I'm also Bdale Garbee's daughter and an AMSAT member for longer than I can remember.

As part of a graduate seminar I participated in this year, I did an investigative history and analysis of the implementation of the Arms Export Control Act of 1976, the legislation which created the ITAR. Considering AMSAT's dealings with the ITAR recently, I thought *AMSAT Journal* readers might enjoy and benefit from some explanation as to why those regulations took the form they eventually did. This article presents the history paper; the second part pf this article describes the implementation.

Introduction

As one of the world's leading superpowers, the United States exerts considerable leverage over matters of foreign policy, arms proliferation, and the enterprise of war. The legislation and outlined priorities of the Federal Government reflect these vested international interests – and like the situations these policies address, are themselves complicated and nuanced. Unlike the process outlined in a popular segment of the series *Schoolhouse Rock*, how a bill becomes a law is contingent upon much more than the administrative checklist outlined in the Constitution. And while this is true even for uncontroversial laws with broad congressional and popular support, it is even more so for those laws which govern American participation in socially sensitive subjects, such as arms and export control. The cornerstone of American involvement in the international arms trade is the International Arms Export Control Act of 1976, officially known as 94 H.R. 13680. In order to understand how this bill became law, this study will begin by highlighting key historical and legislative events in American 20th century involvement in foreign military aid and arms sales. It will then describe the circumstances under which the 94th Congress passed the International Arms Export Control Act, specifically employing the framing of an emergent "policy window," as described by Kingdon.[1]

Vietnam: the War of Communist Aggression

The story of this piece of legislation is that of the United States' involvement in foreign policy since 1940. In reaction to escalating tensions in World War II, Congress passed the Export Control Act in 1940, which first gave the President the power to "prohibit or curtail the export of military equipment or munitions and related items."[2] This is the beginnings of the U.S. Munitions List (USML), which the International Arms Export Control Act would eventually govern. Shortly after, Congress introduced the Mutual Security Act of 1941. This bill clarified the language of the Export Control Act to limit the geographic scope of the section, and in the following year the President's power was extended over "any articles, technical data, materials or supplies." Widespread shortages of arms and basic munitions supplies after World War II led to control of exports to avoid inflation caused by foreign demand for the same. In 1947, Congress amended the Neutrality Act at the behest of President Truman:

> The present system of supervising this country's international traffic and trade in arms and munitions of war was conceived during a period of neutrality and with the view to remaining out of war ... We have committed ourselves to international cooperation through the United Nations. If this participation is to be fully effective this Government must have control over traffic in weapons which will permit us to act in accordance with our position in the United Nations and will be adaptable to changes in the international situation. Therefore, there must be new legal provisions enabling the exercise of discretion in the granting or rejecting of applications for export or import licenses for arms, ammunition, and implements of war and related items.[3]

This represented a markedly different stance towards foreign military engagement that would shape U.S. foreign policy in the emerging conflict in Vietnam. In 1941, Ho Chi Minh formed the Viet Minh (who would later become the Viet Cong). 1949 saw the signing of the Mutual Defense Assistance Act, which was the first foreign military aid legislation of the Cold War. This followed closely behind Truman's signing of the Economic Cooperation Act (the Marshall Plan) in 1948. This act was reauthorized in 1950 but was supplanted, in addition to the Marshall Plan, by the Mutual Security Act of 1951. Its newly formed agency, the Mutual Security Administration, oversaw the responsibilities previously held by the agencies it replaced; namely economic assistance programs that furthered the defense capabilities of US allies, and supervising all foreign aid programs (including military and non-military aid). These policies and their evolutions would become the crux of the American attempt to contain the spread of Communism at home and abroad.

In the meantime, the conflict in Vietnam reached a head, culminating in the Geneva Accord of 1954, splitting the country into North and South Vietnam, ostensibly pending national elections for a country-wide president in two years' time. Ngo Din Diem was named President of South Vietnam, and quickly allied himself with American interests. Unfortunately, the promised elections were never held, and the country again devolved into chaos. In May of 1961, President Kennedy sent one hundred special operations troops to South Vietnam for the purpose of "military advisement." Just two years later, both President Diem and President Kennedy were assassinated within three weeks of each other.

Upon his (re)election, President Johnson sent a budget to Congress in 1965 containing the biggest expansion of domestic welfare programs since the New Deal, reflecting his goal of providing funds for both the war and what was called the "Great Society." The following year, Congress grudgingly authorized $12.8 billion to help finance increased U.S. engagement in Vietnam, following a lengthy and heated debate on the floor regarding the merits of the war itself. In 1968, Congress passed the Foreign Military Sales Act, which gave the office of the President even wider control over arms sales (this is a provision which President Nixon abused by secretly arranging to sell Iran, Saudi Arabia, and Kuwait sophisticated

1 Kingdon, John W. Agendas, Alternatives, and Public Policies. New York: Addison-Wesley Educational, (1984/2003).
2 "Export Controls." In CQ Almanac 1949, 5th ed., 05-403-05-404. Washington, DC: Congressional Quarterly, 1950. http://library.cqpress.com/cqalmanac/cqal49-1400247.
3 "Message to Congress: Truman on the Arms and Neutrality Act." In CQ Almanac 1947, 3rd ed., 10-370. Washington, DC: Congressional Quarterly, 1948.

weaponry).[4] In 1972, in the wake of the Watergate scandal, which eroded national confidence in the office of the President, Congress levied a trade embargo against Vietnam. After the resignation of Nixon, and under the watch of President Ford, the U.S. airlifted its last troops out of Saigon after the North Vietnamese captured the capital, marking the end of the Vietnam War in April of 1975.

However, the end of the Vietnam War did not also mark the end of strained tensions between the President and Congress over the sale and export of arms. In May of 1975, President Ford brokered a secret deal with Jordan to sell them an advanced missile defense system, and timed the deal so as to coincide with the Congressional summer recess, in order to avoid legislative branch oversight of the sale.[5] In July of 1975, North Vietnam annexed South Vietnam, and the following summer, Congress began the work of drafting comprehensive arms and export control legislation.

A Policy Window Opens

In his seminal book *Agendas, Alternatives, and Public Policies*, John Kingdon lays out a theory of how a bill actually becomes a law. He describes the legislative process in terms of policy, political, and problem "streams" which converge at "policy windows." The policy stream consists of variegated policy communities who generate alternatives and proposals; the political stream deals mainly with shifts in public opinion, changes in the administration, and is influenced by actors from interest groups; and lastly, the problem stream deals with recognizing and identifying problems based on indicators or polarizing events. Policy makers couple combinations of these three parallel streams, most effectively at critical moments in time in order to influence agenda setting and to advocate for their alternatives. A policy window then opens "because of change in the political stream or… because a new problem captures the attention of governmental officials and those close to them." [6] In other words, windows open in either the problem or political streams which lead to coupling with the decision agenda. If coupling does not occur when the policy or political streams drive the governmental agenda, they have little hope of making it all the way into the decision agenda, and from there to the floor of Congress.

The International Arms and Export Control Act of 1976 represents a convergence of all three streams. Firstly, issues of "national security" defined the problem stream during the Cold War. To an overwhelming degree, Congress and the nation held the position that national security policy was somehow unique, and therefore deserved more support (and thereby, more resources) than other policy issues. Secondly, the war in Vietnam dominated the political stream under the Johnson, Nixon, and Ford administrations. Protests of increased U.S. involvement, especially surrounding the draft, reached a national volume in October of 1967, when at least 50,000 protesters marched on the Pentagon in an effort to make their voices heard.[7] Fervent protest of government overreach and abuse only escalated with the emergence of the Watergate scandal, and only began to subside years after the end of the Vietnam War. Finally, this era in national history experienced two abrupt and singular changes in administration, with the assassination of John F. Kennedy and the resignation of Richard Nixon. Kingdon cites presidential turnover as one of the most predictable and fruitful opportunities for new alternatives and priorities to make it onto the governmental agenda[8], and the period of time between 1963 and 1976 saw unprecedented upheaval in the White House. Not only did this open repeated opportunities for agenda setting, but it also dominated the national opinion of the commander in chief. Trust in the office of the President waned with Johnson, and took a nearly fatal hit with the discovery of Nixon's involvement in Watergate. This atmosphere of distrust in the President only compounded public skepticism of the government's effectiveness in general, and quickly made its way into the discourse of policy makers and representatives in Congress. In fact, this distrust of executive branch authority set the tone for coming discussions of comprehensive arms and export control.

94 S. 2662

Distrust of the President, while critical to the opening of this particular policy window, was only one piece of the puzzle – policymakers also struggled with increased Soviet military capability and its consequences. In 1974, Congress approved an amendment to the fiscal 1975 foreign aid bill requiring the government to give notice of any plans to sell military equipment to foreign entities worth $25 million or more. Controversy sparked debate on the floor in 1976 by the effort to strengthen that particular provision and extend it to commercial arms sales. Many individual members expressed concern that the United States (as the world's leading arms supplier) was, in effect, promoting international instability rather than peace.

Disagreements over complex technical issues complicated, then crippled the strategic arms limitation talks (SALT II) between the United States and the Soviet Union in 1975, stalling a new agreement on nuclear weapons control anticipated early in the year. The Ford administration's refusal to forbid the use of strategic weapons during a conventional war with the Soviet Union worried arms control circles and many on Capitol Hill in mid-1975. Defense Secretary Schlesinger argued during the summer of 1975 that this decision was necessary to deter attacks on the United States and its allies. "If one accepts the no-first-use doctrine, one is accepting a self-denying ordinance that weakens deterrence," a Rand Corporation nuclear strategist told a group of reporters on July 1 [9]. Critics of the "first-use" strategy were concerned that this policy, in conjunction with a Pentagon decision to aim nuclear warheads at Soviet missile silos, would bring the horizon of nuclear war much closer, despite Schlesinger's previous arguments to the contrary.

The Ford administration also insisted that the Soviet Union military forces would outmatch those of the US by the late 1970s if its full budget request was not approved by Congress. It would cost the United States $114 billion to pay for the Soviet Union's 1975 entire military enterprise (40 per cent more than the United States actually spent on defense that year) according to a CIA analysis released in February. If one disregarded the costs of military pensions, the "dollar gap" was 50 per cent in favor of the Soviet Union. The analysis concluded that in real terms, Soviet military spending

4 Tompa, Peter K. "The Arms Export Control Act and Congressional Codetermination over Arms Sales." American University International Law Review 1, no. 1 (1986): 291-330.

5 Tompa, Peter K. "The Arms Export Control Act and Congressional Codetermination over Arms Sales." American University International Law Review 1, no. 1 (1986). p. 295.

6 Agendas, Alternatives, and Public Policies. New York: Addison-Wesley Educational, (1984/2003); p. 203.

7 Digital History. Vietnam War: Chronology. http://www.digitalhistory.uh.edu/disp_textbook.cfm?smtid=2&psid=3470

8 A more thorough discussion of the role of the administration in policy making can be found in Chapter 2 of Kingdon, p.21 – 22.

9 This statement was recorded in "National Security, 1975 Overview." In CQ Almanac 1975, 31st ed., 361-64. Washington, DC: Congressional Quarterly, 1976.

had increased by nearly 3 per cent annually since 1965, while U.S. spending had declined. According to these statistics, the rhetoric that the Soviets were outmatching the Americans in terms of defense spending was no myth. In addition, roughly 15 per cent of the Soviet Union's $900 billion annual gross national product (GNP) was earmarked for military purposes, according to another CIA study. The U.S. military effort totaled 6 per cent of its $1.5 trillion GNP. The new analysis also took into account the heavy burden of the Soviet policy of "hardening" and geographically dispersing industrial facilities to speed economic recovery from a nuclear attack.

"The quantitative military balance since 1965 had shifted substantially in favor of the Soviet Union," according to a Library of Congress study published Feb. 11, 1976 by the Senate Armed Services Committee. The study concluded that "U.S. qualitative superiority never compensated completely and, in certain respects, was slowly slipping away." [10] The analysis demonstrated Soviet advantages over the United States in numbers of men (4.8 million to 2.1 million), tanks (35,000 to 9,000) and armored personnel carriers (40,000 to 19,000).

In the face of these statistics, Pentagon critics in Congress did not deny that the Soviet buildup required a U.S. response. But they maintained that the administration exaggerated the situation by assuming that the Soviet Union directed its military activity exclusively against the United States, ignoring their parallel commitments on the Chinese border and the need to keep order in Eastern Europe. They also insisted that the administration's argument understated the technological superiority of U.S. weaponry. They argued that cost comparisons of U.S. and Soviet forces were meaningless since many U.S. technical advantages were beyond Soviet reach at any cost. Many of the leading congressional critics nevertheless accepted the administration's argument that military spending had to increase at a rate sufficient to offset the cost of inflation and, in addition, show some real growth in order to counter the level of Soviet spending.

The issue of U.S. arms sales to other countries dominated the congressional debate in 1976 on the annual foreign military aid bill.[11] For the first time in the history of the post-World War II foreign aid programs, Congress in 1975 separated foreign military assistance and sales programs from economic development legislation. The reason Congress separated economic aid and military assistance was to provide time to revise export statutes governing grants and sales of military goods by the U.S. government and private industry.[12] A push to bring the program under greater congressional control was initiated in 1975, but legislation to restrict the practice, which was being considered in conjunction with that year's foreign aid bill, had not passed either the House or the Senate. The Ford administration adamantly opposed giving Congress a greater voice in arms aid policies. Many representatives saw the program as instigating arms races between countries around the world, and the dispute came to a head in 1976.

Congress then passed a fiscal 1976 foreign military aid bill (S. 2662) in April that contained provisions giving Congress new authority to control sales of major military weapons and equipment to other countries by the federal government and private industry. The bill also gave Congress 30 days in which to veto most arms sales contracts. The Ford administration opposed the congressional veto provision on arms sales as well as language in the bill barring military aid to Angola and Chile, in addition to partially lifting a ban on trade with Vietnam. Also strongly opposed by Ford was a $9 billion per year ceiling on total arms sales, and a provision allowing Congress (by concurrent resolution) to terminate aid to nations found in violation of internationally recognized human rights. Constraining defense spending to $9 billion would be comparable to returning to the gold standard. Ford promptly vetoed the bill, saying it would have made Congress "a virtual co-administrator" of foreign policy. The congressional leadership, realizing it did not have the votes, never attempted to override the veto. Significantly, they also chose to not let the bill simply die. Congress then was forced to consider a new version.

94 H.R. 13680

The measure that replaced S. 2662, passed by Congress in June of 1976 was free of many, but not all, of the President's objections. Stricken from the second version was the $9 billion ceiling on total U.S. sales of weapons abroad, and language excluding commercial sales of arms from the provision allowing Congress to reject sales to foreign countries where the cost of a weapon exceeded $7 million. Although it did not give Congress authority to veto commercial contracts, the new bill for the first time authorized congressional review of commercial sales above $7 million for major military equipment and $25 million for other military items.

In addition, H.R. 13680 prohibited private companies from selling any major equipment costing $25 million or more directly to other governments. Such sales would have to be approved and supervised by Congress. Meeting another Ford administration objection, H.R. 13680 omitted any reference to temporarily lifting the U.S. trade embargo with North and South Vietnam. The provision was intended to bring about the return of any U.S. personnel who might still be in Vietnam. Ford had said a lifting of the embargo would lead only to other demands by the Vietnamese.

On June 4, 1976, Congress passed H.R. 13680 and ordered it to be printed.[13] On June 30, the bill was signed into law by President Ford, becoming P.L. 94-329 and C.F.R. Title 22 120-130. The White House released a statement from the President, explaining why he signed this bill in the wake of vetoing its predecessor:

> This bill does not attempt to impose an arbitrary and unwieldy annual ceiling on the aggregate value of Government and commercial arms sales, a ceiling which would have served to hinder, rather than foster, our efforts to seek multilateral restraints on the proliferation of conventional weaponry, and which could have prevented us from meeting the legitimate security needs of our allies and other friendly countries … provisions on discrimination and on human rights in this bill go far toward recognizing that diplomatic efforts, rather than absolute statutory sanctions, are the most effective way in which this country can seek further progress abroad in these areas of deep concern to all Americans, and that the executive branch must have adequate flexibility to make these efforts bear fruit … The one exception to this laudable action is the retention in H.R. 13680 of the "legislative veto" provision regarding

10 The summary of the CIA and Library of Congress studies, in addition to these statements, were recorded in "National Security, 1975 Overview." In CQ Almanac 1975, 31st ed., 361-64. Washington, DC: Congressional Quarterly, 1976.

11 "National Security 1976: Overview." In CQ Almanac 1976, 32nd ed., 271-74. Washington, DC: Congressional Quarterly, 1977.

12 Justification according to the Senate Foreign Relations Committee report on S. 2662.

13 Congressional Record, House of Representatives, June 4, 1976.

> major governmental sales of military equipment and services … this bill will not deter the executive branch from seeking at the appropriate time the necessary authority for the continuation of such programs as the national interest of the United States may require.[14]

This statement highlights the tension between the office of the President and Congress during this period in national history. Ford notes the absence of an "arbitrary and unwieldy" ceiling on arms sales, pointed and provocative language directed at a Congress that attempted to curtail spending in this area. Ford acknowledges the effectiveness of "diplomatic efforts" as opposed to "absolute statutory sanctions," while insisting on continued executive branch "flexibility" to address these national security concerns. He closes this above statement with a clear stance on how he intended to view this particular piece of legislation, as an albeit well thought out piece of red tape when it came to matters of presidential authority in foreign policy and arms sales.

Conclusion

As this study has demonstrated, the various factors that led to the emergence of H.R. 13680, the International Arms and Export Control Act, represent a well exploited policy window that came about due to a convergence of all three of Kingdon's policy streams. Ever since the United States chose to amend the Neutrality Act and enter World War II, national security concerns have dominated the problem stream. This only intensified during the war in Vietnam, and American insistence on curtailing the spread of Communism during the Cold War solidified the desire for more effective arms control. In reaction, actors in the policy stream continued to advocate for increased weapons spending, in order to counter the buildup of Soviet troops and military assets. The political stream during this era witnessed unprecedented changes in administration, as well as fervent and sometimes violent outcries from the American public over U.S. engagement in Vietnam. National distrust of the government, coupled with scandal and abuse of power during the Nixon administration, served to further erode public trust in the office of the President. This created an opportunity for support of increased Congressional oversight in matters of international arms sales, a feature which made it into the final bill despite the misgivings of President Ford. When the streams combined to create a window in the summer of 1976, Congress seized the opportunity to get comprehensive arms and export control to the President's desk. In fact, they managed to do so twice.

With the signing of H.R. 13680, the office of the President became the principal in matters of arms exports and sales. This did not, by any means, mark the end of the prevailing tension between executive and legislative branch jurisdiction over arms and export control. In his State of the Union address in January of 1977, President Ford said the following:

> There can be only one Commander in Chief. In these times crises cannot be managed and wars cannot be waged by committee, nor can peace be pursued solely by parliamentary debate. To the ears of the world, the President speaks for the Nation. While he is, of course, ultimately accountable to the Congress, the courts, and the people, he and his emissaries must not be handicapped in advance in their relations with foreign governments as has sometimes happened in the past.[15]

This attitude represented not only Ford's own views on the responsibility of the President in matters of foreign military aid and arms sales, but also reflected the negotiations of that power soon to come. The evolution and implementation of H.R. 13680 continues to mirror U.S. national security interests, and will be addressed thoroughly in a forthcoming paper.

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15 This quote can be found at http://www.ford.utexas.edu/library/speeches/761057.htm

A Quick Satellite Rover Trip

Kevin Manzer, N4UFO
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I thought I would write up a description about my first attempt at a rover trip with my wife Leigh, N4ICY.

On a Sunday in late June we drove to Rock Hill, SC (EM94mx) We drove along I-77, arriving in plenty of time thanks to planning ahead. The spot I originally picked was surrounded by trees. So we moved over to a Home Depot parking lot.

After taking a bit to get my bearings as to direction, we got all set up. We had to wait a short bit. The pass went smoothly, logging an amazing 11 contacts. We were satisfied that it was a great trial effort.

The next day, with some trepidation over warnings that Yuri might be on the first pass, we headed out to Marion, NC (EM84xq). We first stopped at a rest area and visitors center on US 221, a road that takes tourists from I-40 up into the mountains. I could see what I had not remembered from a stop there a couple years ago. There were surrounding hills and mountains! As soon as I got the antenna together and the radio hooked up and turned on, my headphones were full of signals. Despite there being another roving station on that pass, I managed to get 7 QSOs in the log, thanks in no small part to the 'e-mail list' planning. I was able to call several of the stations.

With this success under our belt, we headed down the other side of the hill from where the rest area was located on to the parking lot location where a Chinese buffet awaited the now-famished XYL. After eating we moved the car a bit to get setup. Without any prompting from me whatsoever, my wife opened up the back of the car and began assembling the antenna. However she insisted I deal with the radio, cables and recorder. This time, I got it online with a few minutes to spare and had enough time to orient myself as to direction a little better. When you are dealing with mountains and such, streets and businesses rarely face properly in the cardinal directions!

As soon as I lifted up the yagi and pointed it in the expected direction I could hear Patrick, WD9EWK, calling me through a bit of crackle. Then in succession, I worked Hector and the other two stations on my 'need the grid' list. I was also called by a couple west coast stations, but that is when the bird started sounding like Field Day as Patrick later put it. Lots of keying and clashing signals, but it finally seemed to clear and got back to making some QSOs. That is despite the one deaf station in my home grid of EM95 calling CQ... e-mail sent, assistance has been offered, I got 9 QSOs in the log this time, with one duplicate from the previous pass. I was very pleased and satisfied with the day's efforts. We began dismantling the antenna and equipment for the drive home. That was when a car drove up and a window rolled down. I walked over to ask, 'I suppose you want to know what the crazy man waving the antenna around is all about?'

Kevin, N4UFO,operating via SO-50 from the Home Depot parking lot he described

XYL Leigh, N4ICY setting up the Arrow antenna

To make a long story short, it was a couple of young people that introduced themselves as 'freelance journalists' who wrote for the local paper. After a bit of chit chat and explanation that told us that they had been watching use from across the way and decided we must be scientists. I retrieved my digital recorder and played a part of the pass for them commenting on the locations of stations as they were heard, which seemed to impress them. 'All over the US?' But I also had to clear up a few minor details, lest I be given too much credit. 'So when did you launch this satellite? Did you do it by yourself?' They still expressed an interest in pitching the newspaper editor on a story about someone coming to town to do all this, so after exchanging e-mails and pictures, we chatted just a bit more before bidding them farewell and loading up.

On the way home, we stopped by a Wal-Mart for a few items. My wife guided me back to the sporting goods to look for a compass. I started to protest when she said, "You need one! I insist! But don't worry, I won't tell any of the other 'men' that you actually use it." I know when to shut up and take good advice - Happy wife, happy life, fellas ... 26 years in May; she keeps me around and plays ham radio with me... must be doing something right. Leigh's words getting back into the car after the final pass was, "That was fun... I really enjoyed that!" With that I'd say, "Mission successful!"

I have all logs are uploaded to LotW and my blank 'rover' cards are printed. I'll not be sending out paper cards to everyone, but if someone needs one, let me know. I logged 22 unique grid contacts in three passes over 2 days. I appreciate the chance to return the favor to many of you for grids handed out to me. It's a collaborative addiction we have - we depend on each other for that next fix.

I want to sincerely thank you all for helping us out. It was most certainly our pleasure.

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http://ww2.amsat.org/?page_id=1121

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AMSAT is looking for an Editor-in-Chief for the *AMSAT Journal.* This position is now open due to the expansion of opportunities in the User Services Department. Our current editor, JoAnne Maenpaa, K9JKM, is also the Vice President of User Services. The Officers and the Board have discovered that it is impossible for a single volunteer to accomplish management of the *AMSAT Journal* with the other pending User Services leadership requirements. Hence we are planning on a handover when a suitable candidate is found.

Experience with the Adobe InDesign CS6 publication system would be helpful. However this system resembles a word processor on steroids; while there is a learning curve it will not be impossible. The editor-in-chief will continue to lead the team of Journal assistant editors arranging for content to publish

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